Landscaping Plan

Constructed Treatment Wetland Development at Tremeirchion WwTW

The Wye & Usk FOUNDATION

Dŵr Cymru Welsh Water

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Revision History

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1.0 Background

1.1. Summary of Proposed Development

Dŵr Cymru Welsh Water (DCWW) are seeking to find alternative delivery of National Environment Programme (NEP) obligations at the Tremeirchion Wastewater Treatment Works (WwTW) in the Clwyd catchment.

The Afon Clwyd has been classified, under the updated 2021 Water Framework Directive classifications, as moderate status for the majority of its length. Tremeirchion WwTW discharges into the Nant Penisa'r Waun, which flows into the Afon Bach a tributary of the Clwyd. NRW have concluded that its Reason for Not Achieving Good status is due to excessive phosphate in the catchment.

DCWW aim to deliver solutions by implementing a Sustainable Management of Natural Resources (SMNR) process, delivering a nature-based solution (NBS) in the form of an Integrated Constructed Wetland (ICW) at the WwTW to achieve a P consent standard of 2mg/l. In addition, DCWW are working with North Wales Rivers Trust (NWRT) to deliver no-regrets additional catchment interventions that promote biodiversity gain as well as wellbeing outcomes.

This proposed NBS project in North Wales would also provide the unique opportunity for wider socioenvironmental benefits to the local community and the ability to conduct research projects on the performance of these NBS systems; the first of its kind in Wales.

The Tremeirchion NBS proposal seeks to deliver the following scheme objectives:

- Improved water quality within the Afon Clwyd
- Provide biodiversity enhancements
- Reduce carbon impact
- Enhance community engagement

1.2. Site Location & Description

The application site comprises a singular application area, located in Tremeirchion, Denbighshire (NGR SJ 06871 72630). The site comprises of a parcel of land used for sheep and cattle grazing, comprising an open field of improved grassland, bordered by a planted hedgerow on the western border and planted/natural regeneration broadleaf woodland alongside the WwTW and Nant Penisa Waun. The wider area includes pastureland, drainage ditches, woodland, interconnecting hedges and the village of Tremeirchion. The site is located directly adjacent to the existing Tremeirchion Wastewater Treatment Works (WwTW) which is owned by DCWW. The application site is approximately 1.1 Ha, and is moderately flat with a gentle slope to the west.

1.3. Proposed Development

The proposed scheme will deliver full treatment of domestic wastewater from Tremeirchion village, replacing the need for the existing WwTW which is in disrepair. The proposed NBS scheme will

consist of two septic tanks for primary treatment, followed by a sequence of three ICW cells for secondary and tertiary treatment before discharging to the Nant Penisa Waun, which flows parallel to the site. The wetland cells are shallow, densely vegetated, free surface flow systems which are interconnected by 225-mm PVC pipes and fitted with an adjustable arm at the outlet for regulating water level within each cell. ICWs are a proven treatment process used across the water industry for wastewater treatment, used more widely in Ireland and USA. They are effective at removing pollutants such as Ammonia, Biochemical Oxygen Demand (BOD), Suspended Solids and Phosphorous, among other micropollutants and heavy metals.

The existing WwTW will be kept as a standby facility throughout the ICW commissioning and three-year operating technique agreement (OTA) period.

The aim is for the NBS to treat effluent to an improved standard (2mgTP/l) before discharging to the Nant Penisa Waun. The site layout of the proposed works is illustrated in the site plan below (Figure 1).

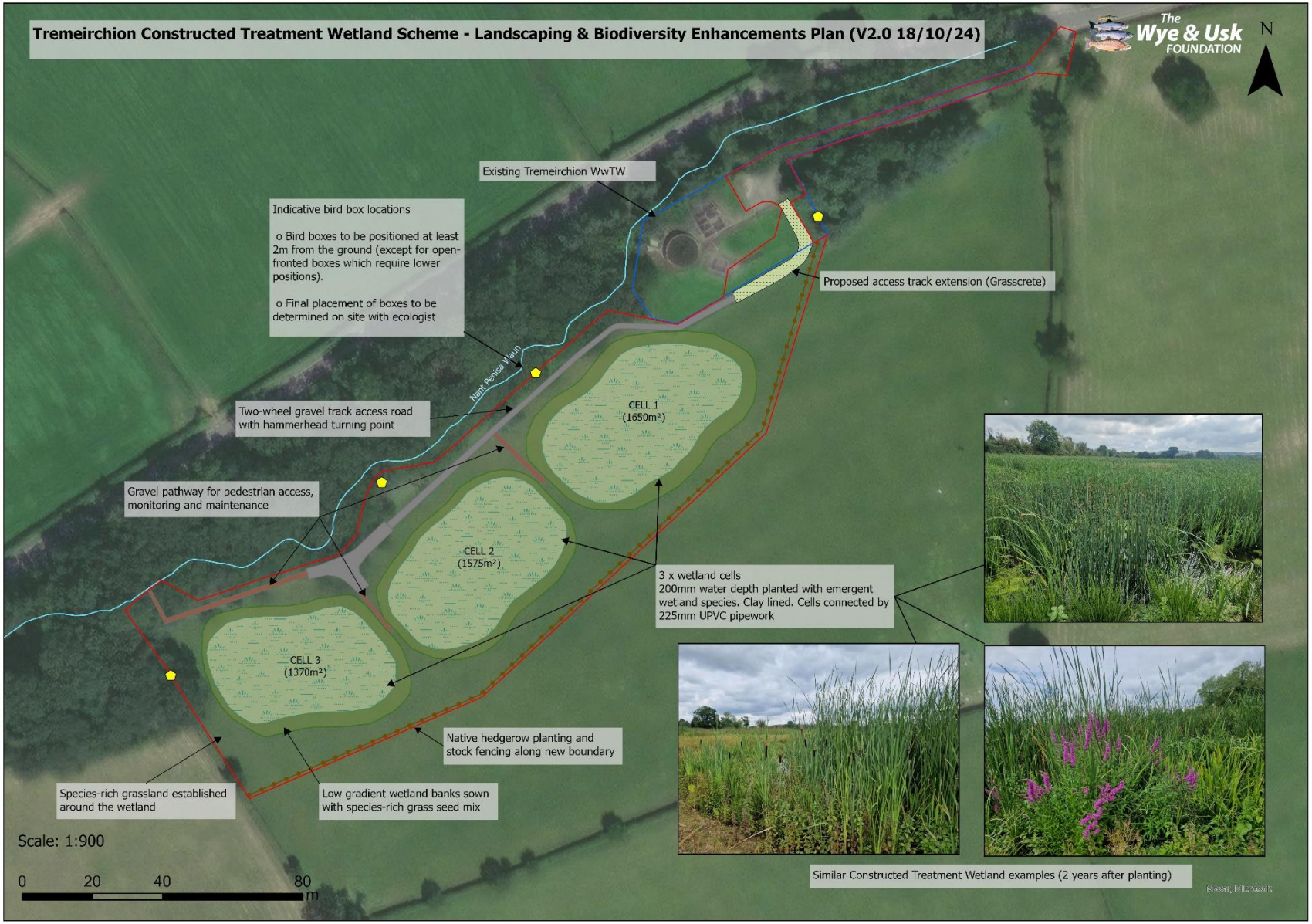

Figure 1. Tremeirchion Site Layout

1.3.1. Proposed Planting

The proposed development presents many opportunities for the enhancement of the site, including the provision of a diverse wetland habitat creation to allow for a range of aquatic and terrestrial species. This would represent an opportunity to contribute to ecosystem resilience of the local area in terms of diversity and extent of wetland habitats. Overall, the proposal would improve the water quality of the Afon Clwyd resulting in the improvement of environmental quality on site and the wider area. Wider opportunities for enhancements on site also include native hedgerow planting and species-rich grassland as detailed in the following sections.

Hedgerow creation

A new bunded hedgerow will be planted along the southern boundary of the site, delivering additional biodiversity net benefit on site. The hedge plants will be planted into a low bund of 0.5m height in keeping with the local landscape. The planting will consist of a mix of the following: Blackthorn (*Prunus spinosa*), English elm (*Ulmus procera*), Hazel (*Corylus avellana*), Dogwood (*Cornus sanguinea*), Privet (*Ligustrum vulgare*), Elder (*Sambucus nigra*), Black poplar (*Populus Nigra*), Oak (*Quercus robur*), Common hawthorn (*Crataegus monogyna*), Holly (*Ilex aquifolium*), Dog rose (*Rosa canina agg*.) and Field rose (*R. arvensis agg*.).

Hedging plants should be 60-80 cm high, bareroot, healthy and vigorous transplants, planted in a double staggered row, 450mm apart, and 7 plants per linear metre. All transplants shall be protected with a 400mm high plastic spiral rabbit guard supported by a 750mm stake or cane. Species mix proportions to be as follows:

- 35% *Crataeagus monogyna* (Hawthorn)
- 35% *Corylus avellana* (Hazel)
- 10% *Prunus spinosa* (Blackthorn)
- 10% *Ilex aquifolium* (Holly)
- 10% Additional aforementioned species (English Elm, dogwood, privet, elder) and standard hedgerow trees to include a black poplar and 3 oak trees in keeping with hedgerows in the surrounding area

Dog Rose (*Rosa canina*) can also be planted as an additional non woody species but is not considered part of the 5-7 plants per metre. This species will also quickly colonise naturally.

Wetland Planting

The wetland cells will be populated with native emergent wetland plants at a density of 6 – 9 plants per m^2. Plug plants will be supplied by a commercial wetland plant nursery and hand planted directly into the clay liner. The water levels will be maintained at 5 – 10 cm during the first growing season while the plug plants become established.

Wetland plant species		%	Area (m2)	No of Plants
Iris pseudacorus	**Yellow-flag Iris**	7	368	2206
Carex acutiformis	**Lesser pond sedge**	18	893	5359
Typha angustifolia	**Narrowleaf cattail**	16	775	4652
Glyceria maxima	**Reed Sweet Grass**	18	893	5359
Sparganium erectum	**Branched bur-reed**	20	650	5854
Schoenoplectus lacustris	**Common club rush**	9	427	2559
Equisetum hyemale	Rough horsetail	2	88	530
Eleocharis palustris	Common spike-rush	2	88	530
Carex pseudocyperus	Cyprus sedge	1	59	353
Caltha palustris	Marsh marigold	1	59	353
Mentha aquatica	Water mint	2	59	530
Persicaria amphibia	Water smartweed	1	59	353
Juncus effuses	Soft rush	1	59	353
Juncus inflexus	Hard rush	1	59	353
Veronica beccabunga	Brooklime	1	29	265
Lythrum salicaria	Purple loosestrife	1	29	177
	Totals	**100**	**4500**	**29786**

Grassland enhancement

The area surrounding the wetland will be improved from existing pasture to a species rich traditional meadow. The majority of the excavated spoil from the wetland cells is to be landscaped within the site boundary, creating an ideal opportunity to further improve biodiversity by planting grasses and wildflowers. As the grass and wildflower mix will grow well on the excavated poorer nutrient sub-soil, the excavated soil can be distributed across the site without needing to target placement in any particular regions.

The site will be sown with traditional, non-rye grasses and wildflowers. The mix should be 80% grass species and 20% wildflower species by weight. The seedbed should be firm, fine and level. The seeds can be broadcast and rolled in.

The grass species in the mix will include many of the following:

- *Dactylis glomerata* (Cocksfoot)
- *Phleum pratense* (Timothy)
- *Festuca pratensis* (Meadow fescue)
- *Crynosurus cristatus* (Crested dogstail)
- *Trifolium pratense* (Red clover)
- *Trifolium repens* (White clover)
- Note: One of the two aforementioned Trifolium species will be sufficient in the mix.

The wildflower species in the mix should include as many of the following as possible:

- *Galium verum*
- *Betonica officinalis*
- *Lotus corniculatus*
- *Lotus pedunculatus*
- *Ranunculus bulbosus*
- *Ranunculus acris*
- *Hypochaeris radicata*
- *Primula veris*
- *Leucanthemum vulgare*
- *Taraxacum officinale*
- *Scorzoneroides autumnalis*
- *Leontodon hispidus*
- *Centaurea nigra*
- *Cerastium fontanum*
- *Plantago lanceolata*
- *Succisa pratensis*
- *Prunella vulgaris*
- *Rumex acetosa*
- *Veronica chamaedrys*
- *Stellaria graminea*
- *Trifolium dubium*
- *Vicia cracca*
- *Lathyrus pratensis*
- *Achillea millefolium*

Management during the first year will involve more regular cuttings taking place to remove annual and invasive weeds. Subsequent to this, management would be in the form of a cut between late July and September. Cutting should be avoided between April and late July to allow the flowering species to grow, flower and set seed.

Weeds and invasive non-native species will be controlled by hand pulling, if not too excessive or treated using a spot herbicide treatment if more widespread.

Arisings from cutting should be collected to minimise nutrient build up in the soil which limits species diversity. A late cut should allow plants to flower and set seed. There may be an opportunity to use cuttings for feedstock, composting and/or a source for seed once the meadow has established.

1.4. Additional habitat benefits

The scheme offers potential for additional habitat enhancements.

Bird boxes will be installed on site, mounted at suitable tree locations along the site boundary. Bird boxes will include:

• Boxes with a 32mm entrance (sparrow boxes)

• Boxes for smaller birds (25-28mm entrance)

• Boxes with 45mm opening (starling box)